NOTES ON THREE RECENTLY PROPOSED AUSTRALIAN TERTIARY ECHINOID GENERA

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Synopsis

The Eocene brissid genus *Gillechinus* Fell, 1964 (type species: *Gillechinus cudmorei* Fell, 1964=*Eupatagus coranguinium* Tate MS.) is considered to be a synonym of *Brissopatagus* Cotteau, 1886.

The Miocene temnopleurid genus *Irenechinus* Fell, 1964 (type species: *Irenechinus hentyi* Fell, 1964=*Coptechinus pulchellus* Bittner, 1892) is considered to be a synonym of *Ortholophus* Duncan, 1887. *Brochopleurus australiae* Fell, 1949 (=*Psammechinus woodsi* Laube, 1869) should also be referred to *Ortholophus*.

The Eocene fibulariid *Lenicyamidia* Brunnschweiler, 1962 (type species: *Lenicyamidia compta* Brunnschweiler, 1962) is considered to possess a typical clypeasteroid monobasal apical system.

In this note three recently proposed Australian Tertiary echinoid genera are discussed. Although the Tertiary echinoid faunas of Australia are at present being revised, it will be several years before relevant sections dealing with all these genera appear. In the interim it is desirable that some comments be given before these genera become established in the literature.

Genus Gillechinus Fell, 1964

This genus was proposed for a species of spatangoid from the "Lower beds, Aldinga, South Australia" which was named *Gillechinus cudmorei* by Fell. The species is in fact Ralph Tate's MS. form *Eupatagus coranguinium* and has been cited as such in literature on the Australian Tertiary (e.g. Pritchard, 1891, p. 183). In the collections available to me (including Tate's original syntypes from the Tate Collection, University of Adelaide) it appears that the species is confined to the Upper Eocene Tortachilla Limestone of the St. Vincent Basin, South Australia.

According to Fell, *Gillechinus* is similar to *Eupatagus* but differs "in the arrangement of the primary tubercles" and the "indistinct closure of the petals". He goes on to observe that *Gillechinus* is unknown outside Australia.

However, in the comparison of the genus with previously described forms, no mention is made of *Brissopatagus* Cotteau, 1863 (type species: *Brissopatagus caumonti* Cotteau). This brissid is world-wide in its distribution (Europe, Egypt, Madagascar, India, N. America) and is confined to Eocene strata. It differs from *Eupatagus* solely in the tuberculated, somewhat depressed areas anterior to each petaloid ambulacrum of the adapical surface. In some species these depressions may be present only in front of the anterior petals, whereas in others the depressions are not well defined. Indeed, Cooke (1942, 1959) has employed *Brissopatagus* as a subgenus of *Eupatagus*, for the differences from *Eupatagus* hardly warrant its generic separation.

Gillechinus cudmorei Fell is a typical species of *Brissopatagus*. Among previously described forms embraced by this genus it resembles most closely *Euspatangus* (*Brissospatangus*) *beyrichi* Dames (1877, p. 82–83, Pl. 11, Fig. 2)

from the Eocene of Verona. It differs from this form in its smaller size, and wider, more rounded outline. *Gillechinus* Fell, 1964, therefore, is here considered to be a synonym of *Brissopatagus* Cotteau, 1886.

Genus Irenechinus Fell, 1964

Fell (1964) has proposed the name *Irenechinus hentyi* gen. et sp. nov. for a specimen of a temnopleurid from the Middle Miocene Bochara Limestone, Hamilton district, Western Victoria. The elucidation of this genus requires discussion of some other Tertiary temnopleurids, in particular, *Brochopleurus australiae* Fell and other species which should be embraced by the genus *Orthlophus* Duncan.

Fell (1949) described the temnopleurid *Brochopleurus australiae* sp. nov. from early Miocene strata exposed along the Murray River Cliffs, South Australia. Examination of many hundreds of specimens from these strata indicates that the holotype (National Museum Victoria P4687) of this species is a juvenile specimen of the common temnopleurid "*Psammechinus*" *woodsi* Laube, 1869. The species exhibits a progressive loss of sculpture during growth so that in large specimens the ridges tend to meet and the sculpture is correspondingly obliterated. A similar loss of sculpture during growth has been reported in living temnopleurids such as *Desmechinus* and *Pseudechinus*. It follows, therefore, that *Brochopleurus australiae* Fell, 1949 is a junior subjective synonym of "*Psammechinus*" *woodsi* Laube, 1869.

A second, poorly preserved specimen which Fell included in his species (National Museum Victoria P4688), is here interpreted as the male form of *Paradoxechinus novus* Laube. Such small specimens differ from "*P.*" *woodsi* principally in the character of the coarser sculpture.

Fell's generic assignment of the species to the Indian Miocene genus *Brochopleurus* also cannot be accepted. In 1887 Duncan proposed the genus *Orthlophus* for his species *Temnechinus lineatus* Duncan 1877 (*non* Bittner, 1892) from Upper Miocene strata at Beaumaris, Victoria. In the past there has been much uncertainty as to the application of this genus (e.g. Mortensen, 1943, pp. 350–1) due to discrepancies in Duncan's descriptions. He gave his species as "sculptured by a network of ridge-like costae" but his figure of *O. lineatus* shows no trace of sculpture. Examination of the type specimen (British Museum (Nat. Hist.) G.S.L. 14078), together with topotype material, shows that Duncan's figure correctly portrays the ornament of mature specimens. In fact *Orthlophus* is a well founded genus and should embrace a group of Australian (and perhaps New Zealand) Tertiary temnopleurid species.

The genus thus employed includes moderate sized temnopleurids with crenulate tubercles, uniserial ambulacra and obscure gill slits. The apical system is regularly dicyclic. Juveniles are strongly sculptured, the sculptural ridges being lost with growth to varying degrees in different species. The girdle consists of rather low auricles united above the ambulacra. *Psammechinus woodsi* Laube is a typical representative of *Orthlophus*.

Orthlophus differs from *Brochopleurus* principally in possessing crenulate tubercles, and hence *Brochopleurus* is not considered to be a junior synonym of *Orthlophus*. Fell (1949), however, described and illustrated his *Brochopleurus australiae* (a small specimen of *Orthlophus woodsi*) as possessing smooth tubercles. The holotype is not well preserved in this respect but distinct crenulation of the tubercles is readily discernible. In this respect it may also be noted that Bittner, Duncan and Laube have all erroneously described (and illustrated) the tubercles as smooth in various species of *Orthlophus*.

To return to the genus *Irenechinus* Fell, this is distinguished by Fell from *Brochopleurus* by the crenulation of the tubercles. It is in fact a typical species of *Orthlophus* in which Fell has recognized the crenulation of the tubercles. The species *I. hentyi* is also identical with that which occurs in the Middle

Miocene horizons along the Murray River Cliffs (the Morgan Limestone) and which was named by Bittner in 1892 (p. 342–4, Pl. 1, Fig. 5) as *Coptechinus pulchellus*.

It is concluded that:

Brochopleurus australiae Fell=*Orthlophus woodsi* (Laube)
Irenechinus hentyi Fell=*Orthlophus pulchellus* (Bittner)

The genus *Brochopleurus* is accordingly unknown from the Australian Tertiary.

Illustrations of these and related temnopleurids will be given elsewhere (Philip, 1966).

Genus Lenicyamidia Brunnschweiler, 1962

This clypeasteroid genus, based on *L. compta* Brunnschweiler, 1962, from the Eocene Merlinleigh Sandstone, Western Australia, was proposed for a coarsely tuberculated fibulariid with an elongate periproct. Particular interest attaches to the apical system of the type species, for it is described as consisting of " Four large genital, one central madreporic, and five small ocular plates . . ." (Brunnschweiler, 1962, p. 167). Such an arrangement of plates is shown in Text-fig. 2A accompanying the original description.

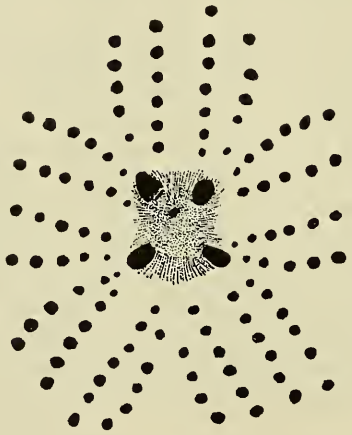

Fig. 1.—*Lenicyamidia compta* Brunnschweiler. Adapical portion of petals and apical system showing the fibrils of the stereome of the madreporite. *Paratype*, Bureau of Mineral Resources CPC 4812, ×20 approx.

All known representatives of the order Clypeasteroida possess a monobasal apical system, i.e., a fused genital disc (the madreporite), with five oculars which usually can be distinguished from the madreporite. The nature of the madreporite is known in *Echinarachnius* where genitals 1 and 3 are lost at metamorphosis and genital 5 does not develop (Gordon, 1929). Genitals 2 and 4 alone fuse to give the madreporite. The apical system of *Lenicyamidia compta* would therefore seem to represent a remarkable departure from that of other clypeasteroids.

Not only is the apical system of *Lenicyamidia*, as portrayed, unique among clypeasteroids, but with its " central madreporic plate " (which would therefore be genital 2) it is without parallel in the class Echinoidea.

Examination of type material of *L. compta*, however, indicates that the species possesses a monobasal system. All material of the species is silicified, and it was found impossible to develop sutures in the adapical region of any

specimen. However, the silification has not obliterated the original fibrils of the stereome. These radiate from the central portion of the apical system to outside the genital pores without marked discontinuities (text-fig. 1). Where alignment of the fibrils of plates of an echinoid test is discernible, the fibrils are generally normal to sutures. It is therefore concluded that *Lenicyamidia compta* lacks discrete genital plates in the apical system which, in its nature, corresponds closely with that of other clypeasteroid echinoids.

A comparison of *Lenicyamidia* with the closely related genera *Fibularia*, *Fibulariella* and *Cyamidia* will be given elsewhere.

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References

Bittner, A., 1892.—Über Echiniden des Tertiärs von Australien. *Sitz. k. Adad. Wissen. Wien, (Math. Natur. Cl.)*, 101 : 331–373.

Brunnschweiler, R. O., 1962.—On echinoids in the Tertiary of Western Australia with a description of two new Eocene Fibulariidae. *J. geol. Soc. Aust.*, 8 : 159–169.

Cooke, C. W., 1942.—Cenozoic irregular echinoids of eastern United States. *J. Paleont.*, 16 : 1–62.

————, 1959.—Cenozoic echinoids of eastern United States. *U.S. geol. Surv. prof. Pap.*, 321 : 1–106.

Dames, W., 1877.—Die Echiniden der vincentinischen und beronesischen Tertiaerablegerungen. *Paläontograph.*, 25 : 1–100.

Duncan, P. M., 1877.—On the Echinodermata of the Australian (Tertiary) deposits. *Quart. J. geol. Soc. Lond.*, 33 : 42–71.

————, 1888.—A revision of the Echinoidea from the Australian Tertiaries. *Ibid.*, 43 : 411–430.

Fell, H. B., 1949.—An echinoid from the Tertiary (Janjukian) of South Australia, *Brochopleurus australiae* sp. nov. *Mem. nat. Mus. Vict.*, 16 : 17–19, fig. 1.

————, 1953.—The origins and migrations of the Australasian echinoderm faunas since the Mesozoic. *Trans. roy. Soc. N.Z.*, 81 : 245–255.

————, 1964.—New genera of Tertiary echinoids from Victoria, Australia. *Mem. nat. Mus. Vict.*, 26 : 211–215.

Gordon, Isabella, 1929.—Skeletal development in *Abracia*, *Echinarachnius* and *Leptasterias*. *Phil. Trans. roy. Soc. Lond., Ser. B.*, 215 : 255–313.

Laube, G. C., 1869.—Über einige fossile Echiniden von den Murray Cliffs in Sud-Australien. *Sitz. k. Akad. Wissen. Wien. (Math. Natur. Cl.)*, 59 : 183–198.

Mortensen, Th., 1943.—" A monograph of the Echinoidea" III (2), Camarodonta I. 533 pp. (C. A. Reitzel, Copenhagen).

Philip, G. M., 1966.—The Tertiary echinoids of south-eastern Australia. Part IV—Camarodonta (2). *Proc. roy. Soc. Vict.* (in preparation).

Pritchard, G. B., 1891.—Catalogue of Australian Older Tertiary Mollusca and Pliocene species in South Australian School of Mines Museum. *Ann. Rept. S.A. School of Mines and Industries*, 176–206.